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1	2283	wire and (623/1.\$ccls. or 623/23.\$ccls.)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/02/27 15:39
2	134	(wire and (623/1.\$ccls. or 623/23.\$ccls.)) and wire with thread	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/02/27 15:56
3	1487	(606/191,198).CCLS.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/02/27 16:16
4	671	(623/1.2,1.16,1.13,2.38,2.4,2.40,1.20).CCLS	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/02/27 16:18

Document	Class	Source	Class	Date	Page
1	US 3593342	USP	19710720	6	
2	US 3620218	USP	19711116	6	
3	US 3663965	USP	19720523	5	
4	US 3683926	USP	19720815	5	
5	US 3726284	USP	19730410	8	
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36	US 4195367	USP	19800401	13	
37	US 4214587	USP	19800729	8	
38	US 4214322	USP	19800729	13	

United States Patent (197) [11] 3,833,940  
**Hartenbach** [45] Sept. 10, 1974

[54] **BILE DUCT ENDOPROTHESIS**  
 [76] Inventor: **Walter Hartenbach**, Schwalbacher Str., 62 Wiesbaden, Germany  
 [22] Filed: **Oct. 16, 1973**  
 [21] Appl. No.: **297,746**

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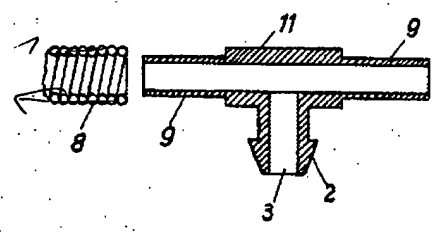
[30] **Foreign Application Priority Data**  
 Nov. 17, 1971 Germany..... 2156954

**Primary Examiner**—Richard A. Gaudet  
**Assistant Examiner**—Ronald L. Frinks  
**Attorney, Agent, or Firm**—Hauke, Gifford, Patalidis & Dumont

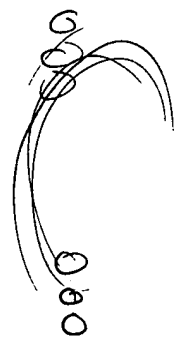
[52] U.S. Cl. .... 3/1, 128/334 C, 128/350 R  
 [51] Int. Cl. .... A61f 1/24, A61m 27/00  
 [58] Field of Search .... 3/1, DIG. 1: 128/334 R, 128/334 C, 348, 349 R, 350 R

[57] **ABSTRACT**  
 A bile duct endoprosthesis having a metal or plastic cannula for introduction into the bile duct and having rounded or beveled ends to aid in insertion and a radially extending portion which serves as a means for attaching a drain hose to the cannula and also as a means for insuring against longitudinal displacement of the cannula after it has been positioned within the bile duct. The cannula has two discrete end sections which are detachable joined to a push on frictional type connector that enables easier implantation of the cannula within a bile duct.

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8 Claims, 5 Drawing Figures



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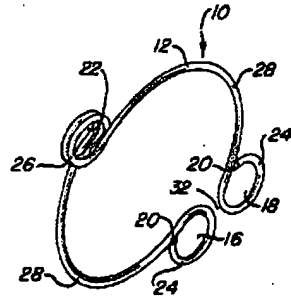


Fig - 1

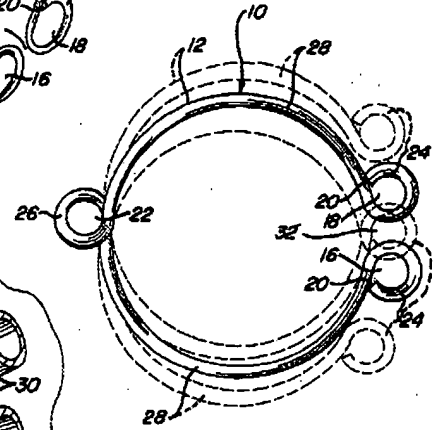


Fig - 2

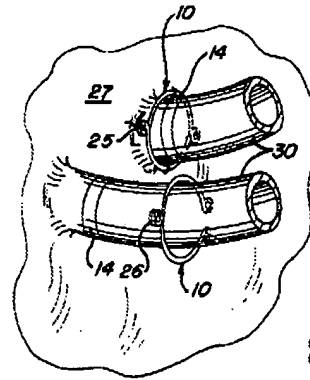


Fig - 4

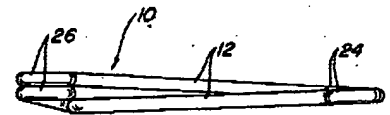


Fig - 3

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126	US 4950227	USP:19900821	10	S	
127	US 4954126	USP:19900904	14	P	
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130	US 4963151	USP:19901016	17	R	
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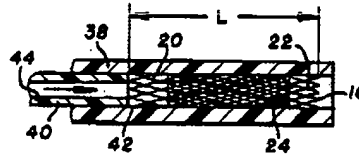


FIG. 2

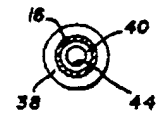


FIG. 3

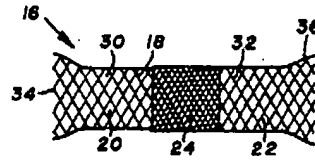


FIG. 1

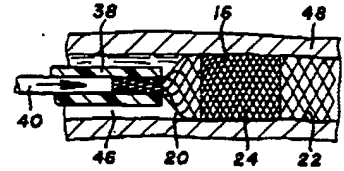


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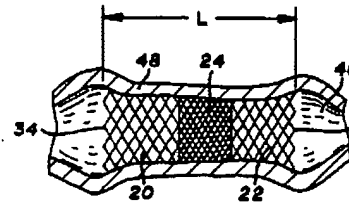


FIG. 5

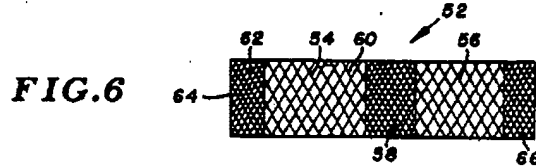


FIG. 6

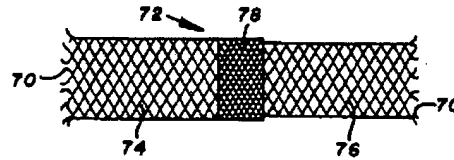


FIG. 7

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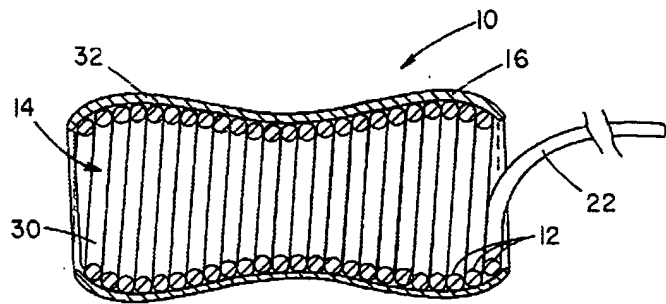


FIG. 4

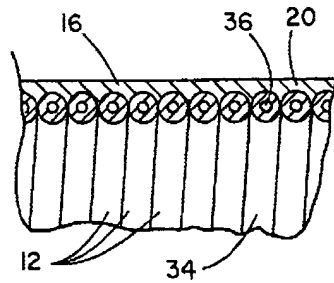


FIG. 5

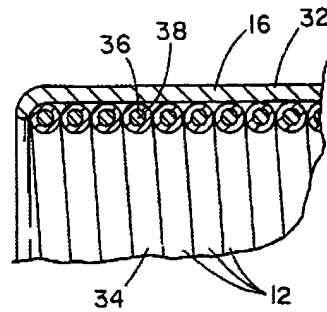


FIG. 6

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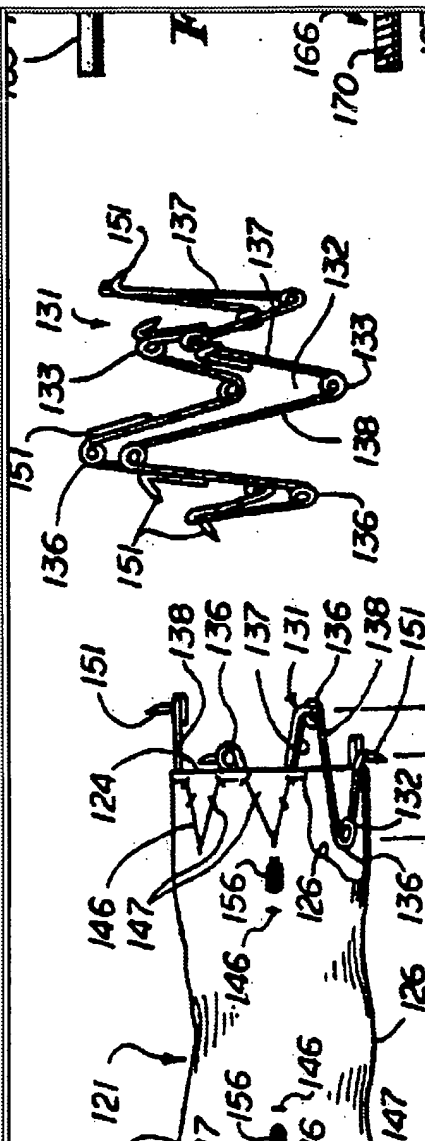


Fig. 10

Fig. 11

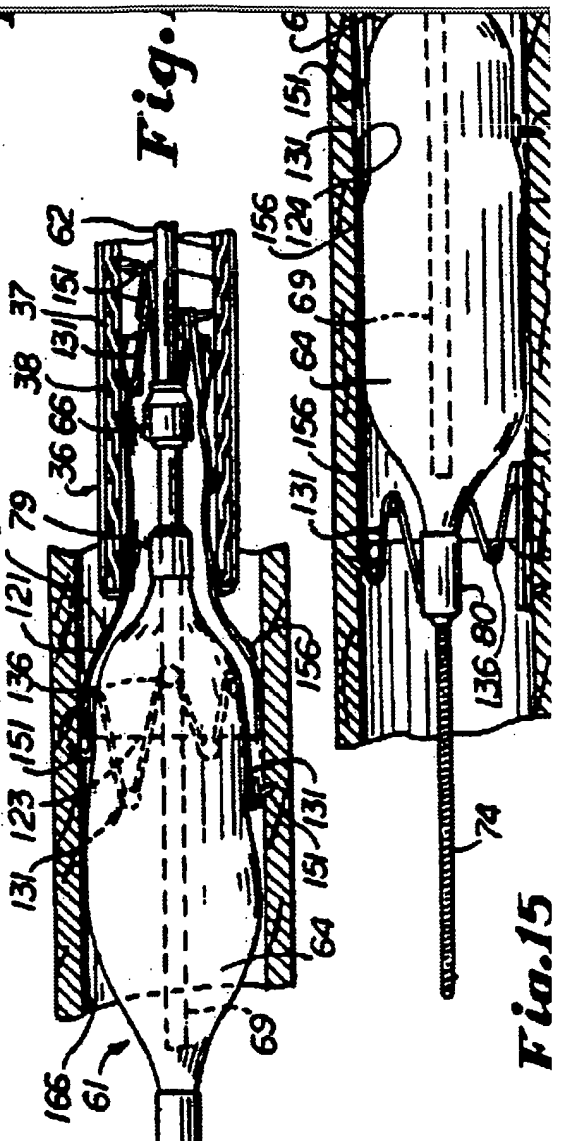


Fig. 11

Fig. 15

Document I	Class	Serial No.	Page	*	
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4	US	4732152	USP:19880322	10	D
5	US	4850999	USP:19890725	8	F
6	US	4875480	USP:19891024	7	D
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43	US	5968088	USP:19991019	17	E

Pat. Nos. 4,655,771 Wallsten); 4,954,126 (Wallsten); and 5,061,275 (Wallsten et al.), the entireties of which are hereby expressly incorporated herein by reference. As shown in the figures of this patent application, this particular stent 14 is composed of rigid but resiliently flexible wires elements or wires 18. These thread elements or wires 18 are formed of metal, such as an alloy of cobalt, chromium, nickel or molybdenum, wherein the alloying residue is iron.

One specific example of a commercially available alloy which may be usable to form the wires 18 of the stent 14 is Elgiloy (The Elgiloy Company, 1565 Fleetwood Drive, Elgin, Ill. 60120). The wires 18 of this stent 14 are arranged in helical configuration about a common longitudinal axis LA. A number of the wires 18 are positioned in substantially parallel relation to one another, but are axially displaced relative to each other. By such arrangement, some of the wires 18 are wound in a first helical direction, while others are wound in a second or opposite helical direction such that they cross on opposite sides of adjacent ones of the wires wound in the first helical direction so as to form a helically braided wire stent as shown in the Figures. This results in the formation of a braided wire stent 14 of generally tubular configuration which is self-expanding and biased to its radially expanded diameter D.sub.2. However, this stent 14 may be radially compressed to a smaller diameter D.sub.1 and radial constraint, as may be applied by the surrounding wall of the tubular delivery catheter 22 shown in FIG. 1, may be applied to hold the stent 14 in such radially compressed state (diameter D.sub.1). Thereafter, when the radial constraint is removed from the stent 14, the stent 14 will resiliently spring back to its radially expanded diameter D.sub.2. The individual, helically wound wires 18 of this particular braided stent 14 move and articulate such that the angular dispositions of the wires 18, relative to one another, will change radial expansion and compression of the stent 14. Also, the longitudinal length of the stent 14 will increase as the stent 14 is radially compressed toward its radially compact configuration D.sub.1, and such length will shorten as the stent 14 expands toward its radially expanded configuration D.sub.2. Thus, the optional PTFE coating 20 is applied to the wires 18 of the stent 14, such coating (described in detail herebelow) is preferably flexible enough to withstand the flexing and movement of the individual wires 18 without cracking or degrading.